

In the Drawings:

Figs. 7A -7C has been objected to as failing to comply with 37 CFR 1.84(d) because it fails to comply with the Specification. According to the Examiner remarks, the Applicant changed the reference number 240 in Figs. 7A -7C from "240" to "140". By this Amendment, the Applicant has corrected the 'obvious-to-correct' editorial error appearing in Figs. 7A -7C of the Specification. The Applicant requests the replacement of Figs. 7A -7C with a new version of Figs. 7A -7C which is attached to this response. No other changes are included in the new version of Figs. 7A -7C.

REMARKS

Reconsideration of the above-identified application in view of the amendments above and the remarks following is respectfully requested. Claims 1-31 are currently pending in the application. New claim 32 has been added.

Claims Rejections – 35 U.S.C. 103

Claims 1-3, 22, and 27-28 were rejected under USC. 103(a) as being obvious over Iwatsuki et al (hereinafter: *Iwatsuki*) U.S. Patent Application No. 2003/0197772 in view of Morita et al (hereinafter: *Morita*) U.S. Patent No. 6,879,378. In the light of the Examiner's remarks, in order to emphasize the inventiveness of the present claims in the light of the prior art, Applicant has amended independent Claims 1 and 22. Accordingly, Applicant believes that *Iwatsuki* in view of *Morita* does not render obvious the amended independent Claims 1 and 22.

Amended Claims 1 and 22 now define:

*"a printing table assembly configured for moving back and forth on each said linear X axis stage; ...
an array of inkjet nozzles mounted on said linear Y axis stage; ... wherein while said printing table assembly passes by said array of inkjet nozzles during said back and forth movements said array of inkjet nozzles is static on said linear Y axis."*

The *linear Y axis stage* of the present invention is designed to allow the positioning of the *array of inkjet nozzles* in several print passes during the printing process, see page 9, lines 10-15 and Figs. 6a-c. The *linear X axis stage*, on the other hand, is designed to allow the moving of the *printing table assembly* back and forth

below the drop-on-demand inject nozzles of the *array of inkjet nozzles*. As further described below, such a configuration is used in order to deal with the effect of acceleration on ink feed to the nozzles.

In known inkjet printing processes, such as in *Iwatsuki*, a platen device, such as the *printing table assembly*, and a printing head, such as the array of inkjet nozzles, are reciprocally actuated during the printing operation to allow the printing head to deliver ink from its nozzles at selected spots on a substrate which is placed on the platen device, see paragraph [0065] of *Iwatsuki*. The reciprocal movement of the printing head in relation to the movement of the printed substrate requires high accelerations on the printhead and on the printed substrate. The high accelerations of the printhead cause ink flow irregularities. Therefore, high accelerations of the printhead, above the substrate, may reduce the quality of the image which is printed on the substrate because the acceleration interferes with the feed of ink to the nozzles. The quality of the printed image is reduced as smearing of and white striping may incur during the printing process if the acceleration forces experienced by the printhead or the platen device exceeds a certain speed level.

Such a force (acceleration) limitation does not apply when the printing is performed using the claimed invention. In the claimed invention the printhead, which is *an array of inkjet nozzles*, is designed to be static when it delivers ink at selected spots on the printed substrate and the accelerations of the printhead are transferred to the printed substrate. As the *array of inkjet nozzles* is static during the printing process, the flow of ink into the nozzles is smooth and the printed image on the printed substrate is not smeared as happens when ink is delivered by a moving *array of inkjet nozzles*, see paragraph [0065] of the present application.

It should be noted that in the present invention, the printed substrate is conveyed in front of an *array of inkjet nozzles*. The *array of inkjet nozzles* is designed to change its position on the *linear motion Y axis stage*. The printed substrate is conveyed in front of the *array of inkjet nozzles* numerous times, once for each printed column in the printed image, and ink is delivered to the appropriate column or columns by the ink head which has been located there by the *linear motion Y axis stage*. Such a configuration allows printing on a number of parallel printing passes without smearing, see Figs. 6a-c of the present application.

The Examiner argues that subject matter of independent claims 1 and 22 does not involve an inventive step as being obvious over *Iwatsuki* in view of *Morita*. The Examiner submits that *Iwatsuki* does not teach:

"a second linear motion X axis stage mounted on said frame parallel to said first axis, and arranged for operation independently of said first axis stage"

This *second linear motion X*, together with the *first linear motion X*, enables bidirectional movement of the *printing table assembly*. This is clearly disclosed in Claim 1 that discloses:

"a printing table assembly configured for ~~movable~~ moving back and forth on each said linear X axis stage;"

Such a bidirectional movement is not disclosed by *Iwatsuki's* teaching.

Moreover, *Iwatsuki*, discloses a device (printing table) that holds the printed substrate which is conveyed in front of a movable printhead while the movable printhead is in motion, see paragraph [0095] of *Iwatsuki*. Thus, in *Iwatsuki*, ink is delivered at selected spots on the printed substrate while the printed substrate and the movable printhead are in motion. Therefore, it is clear that *Iwatsuki's* printhead is not designed to

be static while ink is delivered on the moving printed substrate during the printing process. Therefore, *Iwatsuki* does not disclose the limitations of amended claims 1 and 22 that define an *array of inkjet nozzles* which is configured to be static on said linear Y axis while the printing table assembly passes it by during said back and forth movement.

The Examiner argues that in the light of *Iwatsuki* and *Morita* it would have been obvious to the one having ordinary skill in the art, at the time the invention was made, to modify the *Iwatsuki* printing device to include a second table/stage that operates independently from the first table/stage as disclosed by *Morita*, see paragraph four in page 7 of the Office Action mailed June 30, 2006. Applicant submits that *Morita* discloses an exposure apparatus that includes two transferring tables/stages, each configured to operate independently, see the Abstract of *Morita*. However, *Morita* does not disclose, imply or even suggest a printing apparatus. *Morita* discloses an exposure apparatus for use in exposure of plate-type units, such as printed circuit boards, and a method of conveying a mask and the unit. *Morita* particularly relates to an exposure apparatus and an exposing method for alternately aligning and exposing units in a load/unload position and an exposure position, see column 1, first paragraph of *Morita*. Thus, it is clear that *Morita* does not encounter the aforementioned force (acceleration) issue as a velocity limitation since no ink is being fed. Therefore, *Morita* does not disclose any kind of digital printing machine which is disclosed in amended claim 1 or any scheme for actuating it. A skilled person using a state of the art printing machine and encountering the ink feed and smearing problems therein would not be led to look at *Morita* since it does not have any kind of ink feed. The skilled person would have to solve these problems independently, which he is not able to do. The relevance of *Morita*

would only become apparent if at all, in retrospect, that is after already inventively selecting the solution of separate X and Y moving trays.

Therefore, it is clear that neither *Iwatsuki* nor *Morita* nor the combination thereof disclose or imply a printing device having an *array of inkjet nozzles* which is configured to be static on linear Y axis while a printing table assembly passes in front of the *array of inkjet nozzles* in back and forth movements. Moreover, there is no hint either in *Iwatsuki* or *Morita* or in the combination thereof of a printing device with a table assembly which is actuated in back and forth movements. It should be noted that in order to establish a *prima facie* case of obviousness, the prior art references when combined must teach or suggest all the limitations of independent claims 1 and 22 (*In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). The Examiner's references, as elaborated above, do not teach or suggest the printing device of the claimed invention. Therefore, no *prima facie* case of obviousness is established regarding the claims 1 and 22 limitations.

It should be noted that for establishing a *prima facie* case of obviousness there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. As described above, the present invention solves ink feed and smearing problems due to excessive force (acceleration) in the printhead during high speed printing on known printing processes. *Iwatsuki*, who describes a platen device for holding a workpiece in an ink-jet printer, does not address or recognize the force (acceleration) limitation, see Abstract of *Iwatsuki*. Moreover, *Morita*, who describes an exposure apparatus and a method of conveying a mask and workpiece, does not use ink and therefore the acceleration issue above simply does not arise. Therefore,

it is clear that there is no suggestion or motivation to modify Iwatsuki, who does not refer to the aforementioned force (acceleration) limitation by adding the teachings of Morita, who also does not mention or suggest the issue. Thus, Applicant strongly believes that there is no suggestion or motivation to make the present invention's system is found in the cited references.

It is thus respectfully submitted that independent claims 1 and 22 are allowable for all of the above reasons. Furthermore, it is believed that the dependent claims 1-11 and 22-31 are allowable as being dependent on allowable main claims.

Claims 13-19 are rejected under USC. 103(a) as being obvious over *Iwatsuki* et al in view of *Codos* et al (hereinafter: *Codos*) U.S. Patent No. 6,755,518 and *Rasmussen* et al (hereinafter: *Rasmussen*) U.S. Patent No. 6,536,894.


Codos discloses a printing method and apparatus for ink jet printing on rigid panels using a number of movable printheads, see abstract of *Codos*. *Rasmussen* discloses a print media preheating method and apparatus that uses heat, vacuum and mechanisms for drying and flattening a sheet prior to ink-jet printing thereon, see abstract of *Rasmussen*. Neither *Codos* or *Rasmussen* nor the combination thereof with *Iwatsuki* discloses or implies a printing device having an *array of inkjet nozzles* which is configured to be static on a linear Y axis while a printing table assembly moves with the printed substrate in back and forth movements in the X axis in front of the array of inkjet nozzle.

The arguments made above in respect of the non-obviousness of claims 1 and 22 apply *mutatis mutandis* to independent claim 13. It is believed that Claims 14-19 are now allowable as being dependent from allowable independent Claim 13.

It should be noted that none of the citations mentioned by the Examiner, or the combination thereof, disclose an X motion printing device with a Y motion printhead which is static during X motion, as defined by present amended claims 1, 13, and 22.

All of the matters raised by the Examiner have been dealt with and are believed to have been overcome. In view of the foregoing, it is respectfully submitted that all the claims now pending in the application are allowable over the cited reference. No new matter is added by the present amendments. An early Notice of Allowance is therefore respectfully requested.

Respectfully submitted,


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Enclosures:

Petition for Extension (2 Months);
Additional Claim Transmittal;
Letter to Chief Draftsman;
Annotated Marked-Up Drawing Sheet;
Formal Drawing Transmittal; and
Replacement Drawing Sheets.



Serial No.: 10/776,163
Inventor: Ofer BEN-ZUR

ANNOTATED MARKED-UP SHEET
Attorney Docket No. 29066

Sheet: 1 of 1
Title: Digital Printing Machine

9/10

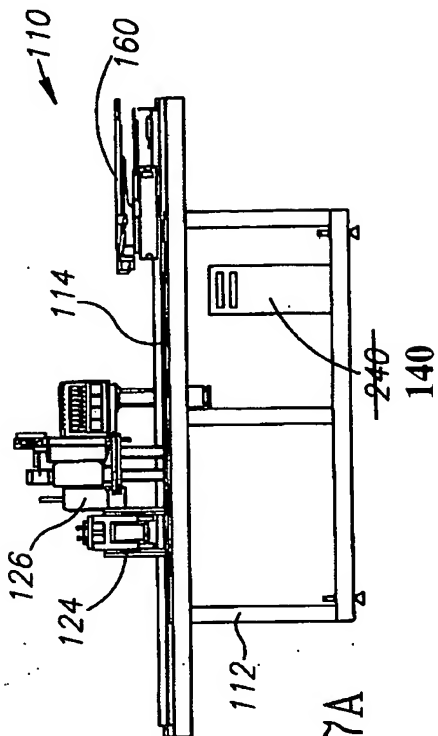


FIG. 7A

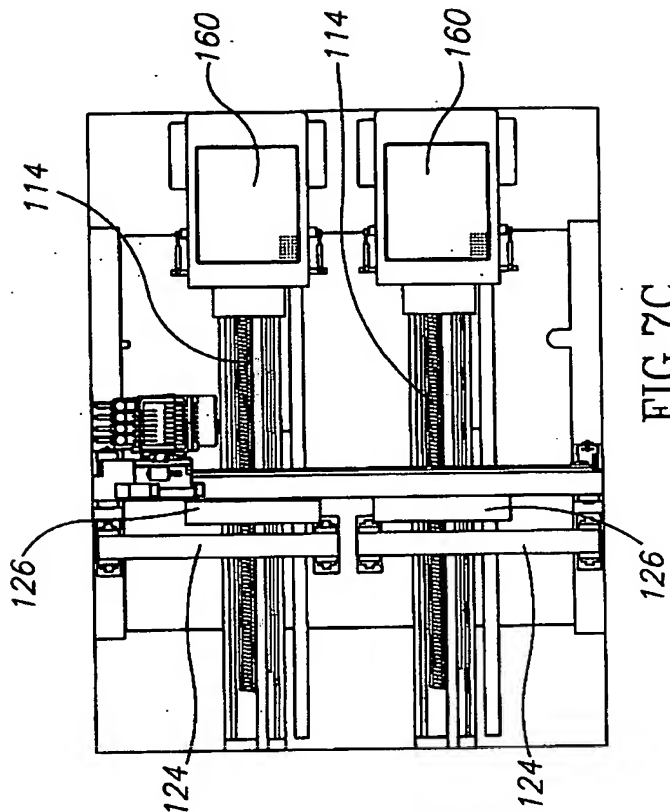


FIG. 7C

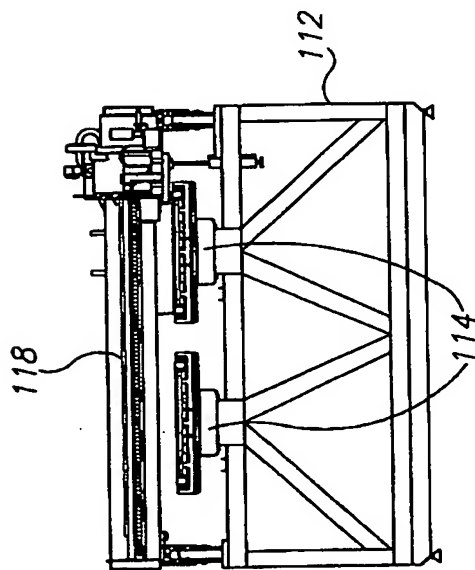


FIG. 7B